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36/11

Combat Crew

strategic air command

November 1986

★★★★

Special Feature

Giant Shield . . . page 4

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Combat Crew

SACRP 127-1 VOL XXXVI NO. 11 NOVEMBER 1986

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Contributions are encouraged as well as comments and criticism. Direct correspondence with the Editor is authorized. Address correspondence to Editor, Combat Crew, HQ SAC/IGFE Offutt AFB, NE 68113-5001 AV 271-2620/6221.

ON OUR COVER

Combat Crew salutes all the hard-working participants of the 1986 SAC Combat Weapons Loading Competition. For results, see page four.

FLARE

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Meeting The Conventional Challenge

"Peace . . . is our Profession." No better motto could apply to the Strategic Air Command than this one. The unprecedented era of peace which this nation and Western Europe have known since the conclusion of World War II coincides almost exactly with the establishment of SAC. The message is clear: strategic nuclear deterrence works.

However, warfare hasn't been eradicated altogether. The world's trouble spots are too numerous to mention; in fact, a recent newspaper article noted that no fewer than forty armed conflicts are ongoing right now. Some of these confrontations could impact the interests of the United States, its friends and allies. The potential for conventional war remains a reality, and SAC has a vital role to play in assuring, or restoring peace. We must plan for multiple contingencies, testing our plans and weapons systems and refining every capability as threats emerge and evolve.

This command has unique resources and outstanding personnel for meeting the conventional challenge. Our ability to deliver large payloads rapidly and accurately over long distances is unrivaled. Regardless of weather or time of day our B-52 and FB-111 force remains a highly flexible element of deterrence at all levels of the spectrum. Theater commanders can depend on us for strategic bombing or for interdiction in support of ground forces. The B-52s also support the U.S. Navy in a variety of ways, including mine laying with the MK 60 Captor torpedo, sea surveillance and anti-ship operations. Two B-52G squadrons are currently equipped with the Navy's Harpoon anti-ship missile, increasing our ability to project firepower well beyond the reach of other forces.

SAC's tanker force plays no less crucial a role in meeting the nation's conventional commitments. Conventional flexibility and mobility are empty words without SAC's refuelers. In fact, demands for aerial refueling increase every day, and in response, we plan to reengine all KC-135s with CFM56 engines and 128 Air National Guard and Air Force Reserve KC-135s already have JT3D engines. Initiatives are also being considered to put wing-mounted hose reel pods on all KC-10s to increase their "probe and drogue" potential.

Our conventional role doesn't stop with weapons delivery and aerial refueling. The command's fleet of SR-71s, U-2s/TR-1s and RC-135s can offer timely reconnaissance support to theater commanders. The entire fleet is programmed for significant improvements in survivability and mission capability.

And, of course, the command has highly motivated, professional people, but the conventional challenge will not be met just by having good weapons systems and good people. In SAC, those are "givens." We must meld the two through meaningful exercises, testing ourselves in realistic environments to fine-tune our capabilities and identify areas requiring improvement.

Under SAC's BUSY BREWER deployment program, each tasked B-52 squadron conducts a unit deployment to the European theater approximately every other year. Exercises such as TEAM SPIRIT and CORAL SEA involve the command in JCS-directed and coordinated exercises with our allies in the Pacific theater, while BRIGHT STAR and GALLANT EAGLE are designed to prepare us for contingencies in support of the U.S. Central Command. The lessons in mobility, conventional bombing, mining, sea surveillance, ECM training, refueling, and other actions in conjunction with the Navy, Army and Marines as well as with forces of other nations are invaluable to use. So, too, are the command post exercises involving SAC and each theater (WINTEX-CIMEX, ABLE ARCHER, CRESTED EAGLE, DENSE CROP in Europe; ULCHI-FOCUS LENS in the Pacific; GALLANT KNIGHT in support of USCENTCOM).

In order to enhance our ability to respond rapidly, we will deploy to forward operating bases in certain contingencies. We first tested this in Europe in 1979, when B-52s deployed from Dyess AFB, Texas to RAF Upper Heyford, United Kingdom for approximately two weeks. This year, B-52s have deployed from Loring AFB Maine, and Barksdale AFB, Louisiana, to RAF Fairford, the United Kingdom, and participated in several NATO Exercises.

In the near future, many of you will become familiar with the forward operating base orientation concept through LEADING SHIELD. Members of SAC regular, Reserve and Guard units will visit forward operating bases in order to increase their knowledge of these locations. The payoff will be smarter, quicker, conventional responsiveness and, in particular, increased sortie production. The program is under way and has produced encouraging results. For example unnecessary equipment has been identified and deleted from deployment requirement packages.

To speed employment following unit deployment and to improve SAC integration with other forces we send an advanced echelon (ADVON) to the theater of operation. The ADVON's key responsibility is to advise the Air Component Commander on how best to use SAC resources. Once the determination has been made as to the mission to be flown, the ADVON will then frag the bomber and tanker missions, a task traditionally done by hand. Now, with off-the-shelf hardware and software, the Deployable Aircraft Planning System (DAPS) has been successfully tested and appears to be the near-term answer to our need for a deployable, stand-alone mission planning system. It's been funded, and a prototype is in hand. The DAPS will be integrated later with a more advanced system under development called UMPS (Unit Mission Planning System).

The number one responsibility of the Strategic Air Command must remain its role in the triad that deters nuclear war. But the conventional responsibility has not diminished; if anything, it has grown. So, too, have the command's capabilities. We must keep ourselves razor sharp for any contingency, always hoping that peace will prevail but always prepared to meet aggression on any level in order to restore peace. That is our profession.★★

Major General Robert D. Beckel
Chief of Staff
Strategic Air Command

Why Not Minot?

. . . 5 BMW Wins Barrentine

Maj Bob Neidrick
Editor

The 1986 edition of the SAC Combat Weapons Loading Competition is history. The 5 BMW "Bomber Barons" of Minot AFB took home the Barrentine Trophy as they totaled 2713 points of a possible 3000. In addition to the Barrentine, the 5 BMW won honors for the Best Crew Chief, Best SRAM Load Team, Best Combined Load Team and the Best Security Police Leadership Trophy.

Maj Joseph R. Schuler, the Minot wing project officer, commented, "Preparation was difficult because the team consisted of members from three squadrons and two wings (5 BMW and 91 SMW). Everybody pulled together and worked hard; team spirit pulled us through." Others thought so too as Minot was presented the "Spirit Bell" at the competition banquet. This award is given to the team displaying the highest **esprit de corps** throughout the SAC Combat Weapons Loading Competition. It is distinct from all other competition trophies in that the competitors themselves select the winner.

"Giant Shield" was conducted at Fairchild AFB during the period 18 through 25 September. Representatives from all SAC bomb wings, plus Andersen's 43 SW, competed for the coveted Barrentine Trophy. Each squad consisted of an aircraft crew chief, a munitions load crew and a security police team. However, because of B-1 conversion, Dyess and Ellsworth teams comprised only security police.

The Barrentine trophy is presented to the best wing competition team in SAC. The trophy, first awarded in 1976, was donated by the Boeing company and commemorates the late CMSgt Wilbur R. Barrentine who is remembered by his supervisors and fellow workers as a people oriented manager. Chief Barrentine was associated with Strategic Air Command munitions from the mid 1950's until his death in September 1970, while serving on active duty.

This year's runnerup was K. I. Sawyer chalking up 2675 points. The 410 BMW finished just four points ahead of the 7 BMW, Carswell. Fourth place went to the 416 BMW, Griffiss with

The Moose is Loose at Fairchild. Team members from the 42nd Bombardment Wing, Loring AFB, arrive for the competition.

Members of the 410th Bombardment Wing from K.I. Sawyer are greeted by Col James W. Meier, 92nd BMW commander, Col William R. Lennard, Col Thomas H. Dennin and CMSgt James I. Hume as their team arrives for Giant Shield 1986.

1986 WINNERS

Best Wing Competition Team in SAC - 5 BMW, Minot AFB
Barrentine Trophy

Best Munitions Load Team	**7 BMW, Carswell AFB**
Best Security Police Team	**96 BMW, Dyess AFB**
Best Bomber Crew Chief	**SSgt Jeffrey E. McKenzie, 5 BMW, Minot AFB**
Best ALCM Load Team	**416 BMW, Griffiss AFB**
Best SRAM Load Team	**5 BMW, Minot AFB**
Best Combined Load Team	**5 BMW, Minot AFB**
Best B-52 Load	**7 BMW, Carswell AFB**
Best FB-111 Load	**380 BMW, Plattsburgh AFB**
Best MMS Equipment	**509 BMW, Pease AFB**
Best MMS Testing	**509 BMW, Pease AFB**
Best Crew Chief Preload	**TSgt George P. Nichaolaou 509 BMW, Pease AFB**
Best Crew Chief Post Load	**TSgt John T. Neville 380 BMW, Plattsburgh AFB**
Best Crew Chief Testing	**SSgt Bruce W. Patterson 7 BMW, Carswell AFB**
Best SP Tactics	**96 BMW, Dyess AFB**
Best SP Testing	**319 BMW, Grand Forks AFB**
Best Confidence Course	**92 BMW, Fairchild AFB**
Best SP Combat Rifle	**92 BMW, Fairchild AFB**
Best SP Leadership	**SSgt Paul Goshorn 5 BMW, Minot AFB**
Spirit Bell	**5 BMW, Minot AFB**

2653 points. Last year's winner, Pease, finished fifth with a total of 2547 points.

Munition teams were evaluated on the condition of their equipment, two munition loads and a written exam. The maximum possible score for the load teams was 1400 points. Carswell won Best Munitions Load Crew with 1372 points. Impressively, Minot completed two perfect 600 point loads enroute to a second place total of 1368 points.

Each aircraft crew chief performed an aircraft preload and postload exercise and completed a written exam for a 400 point total possible score. Minot's crew chief, SSgt Jeffrey E. McKenzie won with a total 375 points. The crew chief testing competition was particularly tough as Sgt McKenzie from Minot and SSgt Bruce W. Patterson from Carswell were forced to take two tie-breaker tests. After three exams, SSgt Patterson won by one question. Other notable accomplishments among the crew chiefs included the first perfect preload in two years, by TSgt George P. Nicholaou of the 509 BMW, Pease; and a perfect postload completed by TSgt John T. Neville from the 380 BMW, Plattsburgh.

For the second consecutive year the security police from Dyess won their portion of the competition. The 96 SPS amassed a total of 1019 of a possible 1200 points. Only six points behind was the home team from Fairchild. The cop's competition required exhausting physical exertion, shooting skills and tactical knowledge. The security police competition began with an academic exam which was won by the 321 SPS from Grand Forks. The Best SP Tactics Trophy went to the 96 SPS from Dyess. In this exercise, each police team was faced with an identical terrorist situation. A group of simulated terrorists were near the non alert parking area creating a diversion while their cohorts attempted to storm the alert bomber parking area. The security unit had 25 minutes to eliminate the threat. Both the terrorists and cops used Multiple Integrated Laser Engagement System (MILES) equipped weapons to simulate the action.

The security police squads traveled approximately 70 miles to Farragut State Park in Idaho for the combat rifle competition. Here teams fired live rounds at targets controlled by the Duel-A-Tron 90 computerized target system. Team members had to combine running and shooting from various positions during this exercise. The final phase of the competition

. . . 5 BMW Wins Barrentine

was the physically demanding confidence course. Of the 21 obstacles on the course, only 19 counted toward scoring. According to Col Robert A. Swing, HQ SAC Chief of Security Police and co-sponsor of the competition, "The remaining two were extremely high and considered too dangerous to be completed under time constraints; however, each member was required to demonstrate his ability to cross these pair of obstacles before beginning the confidence course." The 92 SPS team from Fairchild won both the combat rifle course and the confidence course enroute to their second place finish only 6 points behind Dyess.

At the awards ceremony held on 25 September, Gen John T. Chain, Jr, Commander in Chief, SAC, said, "If we had to go to war, we would win because of what you demonstrated here. But because of what you have

SSgt James A. Trainor, K.I. Sawyer AFB, releases tension during a strenuous munitions load.

A1C Robert Lewis, Minot AFB, pushes a weapons carrier into place.

Ellsworth AFB security policemen demonstrate their expertise on the confidence course.

A1C Lawrence M. Folkerts, K. I. Sawyer AFB security police drops from a section of the confidence course during Giant Shield 1986.

Members of the Fairchild AFB munitions crew do what they know best.

A member of the 5th Bombardment Wing, Minot AFB, sets up equipment for a load.

A Fairchild AFB security policeman fires a round during the competition firing exercise.

Pease AFB security policemen take off for the first 100-yard run during the tactical firing exercise.

Dyess AFB security policemen cheer after being announced the Best Security Police team for the second year in a row.

Members of the Castle AFB load crew in action during the 1986 Giant Shield 1986 competition held recently at Fairchild AFB.

The Minot AFB weapons load team rushes onto the stage after the announcement that they had won the Barrentine Trophy.

USAF Photos by:
SSgt Bush, SSgt Hoffman, A1C Garrett, A1C Scott, Amn Shine, Fairchild; SSgt Cagle, Grand Forks; SSgt Covey, Ellsworth; A1C Kobashigawa, Blytheville; and A1C Wright, Carswell.

demonstrated, we won't have to go to war in the first place."

When it was all over, Maj Gen John J. Doran, Jr, Deputy Chief of Staff Logistics, SAC, and the senior co-sponsor of Giant Shield, stated that this was "the best Combat Weapons Loading Competition ever." That thought was echoed by Col Francis L. Eubank, Jr, SAC's Director of Munitions and Competition Commander who added a special note of thanks to the hosts, the 92 Bombardment Wing and its commander, Col James W. Meier. "Their hospitality and outstanding preparation made this year's competition a success."

Congratulations to all who competed; your unit, your command and your nation are proud of you and your accomplishments!

About the author. Maj Neidrick has been editor of **Combat Crew** since July 1984. Prior to this assignment, he flew KC-135Q and A models at Beale and Castle AFBs respectively, the latter as a CCTS IP.

Death of a Slipstick, Part II
Rebirth of Moments

TSgt Tom Minton
CFIC, Carswell

There are still a few "old heads" around who remember when the only way to compute a center of gravity was with the use of moments. During this period there was no such thing as a pocket calculator, much less a programmable calculator. The age of moments ended when SAC converted from the KC-97 to the KC-135. However, with the "Death of the Slipstick," once again the primary means of computing a center of gravity will be by the use of moments.

There have been many questions since the conversion to moments was announced. One of the most frequently asked is, "Why the conversion to moments?" There are three reasons for the conversion. First and foremost is the inaccuracy of the load adjustor. Another reason is the cost effectiveness of converting to moments. Availability of an already proven method of computing an accurate center of gravity is the third reason.

The load adjustor is no longer accurate because of wing reskinning (TCTO 989). When this TCTO is completed it makes the load adjustor inaccurate for fuel computations. As for the cost effectiveness of the conversion, Boeing was approached and asked about the feasibility of developing a new load adjustor to compensate for TCTO 989. Boeing said they could do it; however, the cost would be approximately $1100.00 each.

With the development of the KC-10, moments were re-introduced into SAC. When the 135 was re-engined with the CFM 56, moments were selected as the primary means of computing a center of gravity. When the load adjustor inaccuracy was determined, SAC elected to go with the use of moments because the material for the moments conversion was already available. A programmable calculator and software were also available, at a cost considerably less than the cost for engineering a new load adjustor.

Now that the conversion has started more questions have surfaced. One is, "What does the use of moments offer you that the load adjustor doesn't?" With the use of moments you arrive at a more accurate center of gravity. You have the ability to enter cargo more accurately with moments than you did with the load adjustor. When you entered a weight into a compartment with the load adjustor it automatically assumed the weight was in the center of the compartment. With moments you have the ability to enter the exact location of the weight in that compartment. To illustrate, let's say you have an aircraft with a takeoff weight uncorrected of 221,928 and moment/1000 of 188,231. Now assume you have 5,000 pounds of cargo with 1,000 pounds in compartments C through G. If you use the load adjustor you come up with a center of gravity of 22.7. Now determine a center of gravity by the use of moments. Put the cargo in the front of the compartments, in the center of the compartments and in the aft portion of the compartments. You should get a center of gravity of 22.3, 22.5, and 22.9 respectively. As you can see, the use of moments is more accurate than the load adjustor. The question now arises, "We've done it this way for years, why change now?" As boom operators we are responsible for providing our pilots with the most accurate and up-to-date information available. This is no longer possible with the load adjustor.

When the Weight and Balance workbook was issued several more questions came to light. One of them was, "Why do we need to know how to compute a center of gravity with the use of moments? We will have the hand-held computers." This is one of those areas that you can "what if" to death. Just remember, "If it can go wrong, it will." It is your responsibility to know this method of computing a center of gravity in order to insure the accuracy of the information given to the pilots whether you have a calculator available or not.

As you are reading this article the boom operators leaving Castle are arriving at their new duty stations competent in the use of moments but lacking any knowledge of load adjustors. Remember, it is our responsibility to become as proficient as we possibly can in the use of moments to ensure the safe operation of the aircraft.

For more information see "Death of a Slipstick, Part I" published in the January 1986 issue of Combat Crew. Ed.

About the author. **TSgt Tom Minton entered the Air Force in late 1977. After completion of technical training, he was assigned to the 97 AREFS at Blytheville AFB, AR as a KC-135 Boom Operator. He is currently a CFIC instructor at Carswell AFB.**

Hey Boom, What's the CG?

Capt Dan Farrish
9 AREFS, March AFB

It was 1:00 a.m. in Saudi Arabia. We had just taken off heavyweight for a refueling with a heavy receiver. As I opened the necessary drain valves to move the fuel forward and aft for the large offload, departure requested a "best rate of climb" to clear conflicting traffic. The AC raised the nose while I set MRT, and we scanned the dark sky for the nearby Boeing 737. A few moments later I noticed the aft body tank reaching the desired 35M lbs. While closing the wing to aft body tank valve switches, I realized the center wing tank was not draining forward. Glancing at the stab trim indicator, I could see it passing two units nose down. The boom had checked off to prepare for AR and the pilot was busy clearing for the other aircraft; at that moment it was my fuel panel and I had no idea what our CG was. Knowing we were somewhere aft of 30 percent of MAC and probably forward of 50, I said, "Uh, pilot, I think we have a little aft CG." The pilot looked at the fuel panel, mumbled a couple expletives, lowered the nose to a shallow descent and notified departure. To our relief, the center wing began to drain forward when we reduced our abnormally steep pitch attitude.

What is the moral of the story? It's not to prove that the tanker will fly with a CG that is off the charts — which we did! As a pilot or copilot, are you able to quickly and accurately determine a CG, without the boom's help, especially if things don't go as planned? After the Saudi experience I found an easy way to determine a CG within ± .5 percent in a matter of seconds. It is a simplification of the old formula my IP taught me at Castle:

CG = (25 + Ballast) − FWD − 1/3CNTR + 2/3AFT + 2/3RES.

The formula can be broken down into a few simple steps. The key to the equation is determining the ballast during mission planning. It will vary from aircraft to aircraft, especially with Q models, so don't get lulled into assuming the ballast will always be around 6 or 7, since variables such as passengers and cargo can cause the ballast to double. Your boom operator can provide this number for you.

The reserves are full for almost every mission with the possible exception of pattern work. They can be considered a constant along with the ballast: 2/3(5.8) = 4. Therefore, on mission planning day you spent only 30 seconds determining a "reference number" that will stay constant until you dump the reserves.

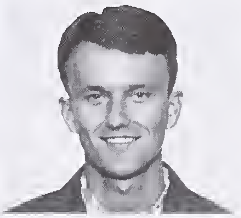
25 + 8 (ballast) + 4 (RES) = 37 ∴ CG = 37 − FWD − 1/3CNTR + 2/3AFT.

Using this reference number in flight, you can obtain an accurate CG anytime by simple arithmetic. Start with the forward body — it's a nice round number. For example, 37 − 20 (FWD Body) = 17. Now just subtract 1/3 of the center wing and add 2/3 of the aft body and you'll have an accurate CG. Sound confusing? It becomes easy with a little practice and you'll have your desired CG for nav legs, landing, cruising across the pond, etc.

Try a quick review. During AR offloading you have: FWD = 20, CNTR = 5, and AFT = 10. Using the reference number you computed during mission planning, you immediately know 37 − 20 = 17. Now 1/3 of 5 is close to 2, so 17 − 2 = 15, and 2/3 of 10 is around 6, therefore 15 + 6 = 21. Using this information we know the CG is near 21 and a bit forward so you may consider using two pumps on the forward body to bring the CG back toward 25.

If you have a lot of experience in the tanker, you may be able to look at the fuel panel and instinctively estimate a CG. Unfortunately, less experienced crew members don't have that ability. Over the years, tanker pilots have developed numerous techniques for monitoring the center of gravity. The Dash One and Chapter four of the Dash Three discuss some CG and fuel management considerations. Another technique involves the stabilizer trim. As fuel moves around and the CG shifts, the autopilot stab trim adjusts correspondingly to maintain level flight. With this in mind, a widely accepted technique is to watch the stab trim setting. In the KC-135, many pilots use a trim setting of ± 1.0 — while not in contact — as a good CG guide. If you find the stab trim beyond the ± 1.0 setting, you may want to recheck the CG to insure a proper percent of MAC. Do whatever works for you. I've found the above formula to be a great aid.

Knowing your CG is important. It saves fuel and helps the aircraft respond better. Granted, being in the ballpark is usually fine for CG determination. If you don't have an accurate CG, it probably isn't going to kill you. Nevertheless there may be a time, as I found out, when the center of gravity can be critical. So until the new fuel panel arrives or you develop the experience to "know" the fuel panel, find a good technique for fuel management, use it, and fly safe.



ABOUT THE AUTHOR

A 1981 graduate of the U.S. Air Force Academy, Capt Dan Farrish later received his masters degree in systems management from the University of Southern California. Currently assigned to the 9th AREFS at March AFB as a KC-10 copilot, Capt Farrish previously was a KC-135 stan/eval copilot.

GALLANT EAGLE '86

Maj Gary Dutelle
HQ SAC/DO8T

Sand blew through the rolled up sides of the tent as I tossed and turned in the 100°F heat, hoping to grow accustomed to my new cot. The creaking, as the other residents of the tent tossed and turned to the rhythm of the blowing wind, kept me awake for the better part of the night. It would continue each night for the foreseeable future. I tried to look at my watch, first by the bright moonlight, and failing to make it out, turned my flashlight on — 0404. Already, I could hear the whine of engines across the ramp. From my tent, I couldn't see the runway and ramp, but could now hear the familiar roar as the KC-135A engines took water and rolled closer and closer. The roar was deafening as the tankers, one by one, passed overhead, lumbering into the sky, loaded to their maximum with JP-4. They would become our "SAC alarm clock" in the days to come. This morning it jolted all of us out of "the rack" and signalled the start of another day at **"war" — GALLANT EAGLE '86** had begun.

I joined long lines, first for a shower and then for a shave. Pulling my mess kit from the A-bag, I dusted it off and opened it, putting it in the proper configuration for "dipping," the pre-meal sanitizing necessary in the field. Pulling on my boots, I bloused my trousers and walked the two blocks to the mess tent. I dipped my kit, signed in and lined up for a traditional breakfast of eggs, bacon, hash browns and a large cup of coffee. Sitting in the mess tent brought visions of M*A*S*H and I couldn't help but imagine what a real war would exact from each of us. I had to give USCENTCOM an "A" in realism; right down to the hot blowing sand we'd find if called upon to respond to the Southwest Asia arena for which the United States Central Command (USCENTCOM) is responsible. We were in the desert of Southern California, in field conditions, training to fight. It was a real test for all the players.

As part of the ADVON, (SAC's Advanced Echelon of advisors to the Air Component Commander) I played an active part in the planning of each day's activities. USCENTAF support staff "invited" us to live in field conditions, simulating the pressures of a war environment, and carrying out day-to-day planning and execution of our airborne forces. USCENTAF set up a Tactical Aircraft Control Center (TACC) or "bubble." We planned the next day's war in combat plans and executed it in the TACC operations "bubble." For ten days, around-the-clock, we lived, ate and tried to sleep, as what seemed like an endless stream of tankers, C-141s and C-130s took off and landed over our work area; trailers and tents set up in a camp at the end of the March AFB runway.

SAC, as a specified command, is charged by the JCS to support USCENTCOM. Tankers, bombers and reconnaissance assets along with the associated support participated in the exercise. GALLANT EAGLE 86, the largest Field Training Exercise in the United States, was made up of components from the Marines, Navy, Army and Air Force. USCENTCOM would literally rule the oceans, land, and skies over most of the western United States from the 25th of July through the 4th of August. Our mission: practice the capability of fighting a war in Southwest Asia. Our support in this flying arena goes to USCENTAF. USCENTAF, as the Air Component Commander (ACC), directed the air employment. I won't dwell on the effort of the Navy, Marines and Army who had ground and ocean wars going on at the same time, but choose, for obvious reasons, to focus on the air efforts. The ACC, with advice from the SAC Advanced Echelon (ADVON) Director and staff, used the SAC forces to bomb targets, deploy fighters, refuel, collect data and redeploy the forces. Thirty-one tankers participated in the exercise at three separate locations. March Tanker Task Force (TTF), consisting of eight KC-135As, four KC-135Rs and three KC-10s formed the largest tanker force. Fairchild TTF had eight KC-135s as did Beale. These three task forces flew 285 sorties and over 1,500 hours in the ten day exercise. Over 16.8 million pounds of JP-4 were transferred to 2,572 receivers, from all three services, around the clock, for 10 days! While the tankers refueled thirsty fighters, the B-52s from Minot AFB, ND, flew six sorties each day to targets in the Utah Test and Training Range and Twenty-Nine Palms Training areas. GALLANT EAGLE 86 provided a superb learning environment for our conventional forces and staffs assigned to support USCINCCENT and USCENTAF. Our bombers clearly demonstrated their capability to deliver large weapon loads, accurately, over long distances, on time!

Fifty-four B-52 sorties flew at a rate of six sorties a day from 25 July to 2 August. Fifty sorties delivered inert weapons to targets while four additional sorties each delivered 51 live Mark 82 Snake Eyes (500-pound bombs) to targets at Twenty-nine Palms Marine Corps Air-Ground Combat Center. Two sorties successfully bombed Lavic Lake, during daylight hours, with live weapons, on 29 July 1986. Lt Gen Kenneth Peek, 8 AF/CC, was on board the lead aircraft during the live drop, while General Crist, USCINCCENT, witnessed the daylight release from a ground observation point. Capt Kevin Schmit, HQ SAC/DOOD, was the range safety observer during the night drop, and witnessed a most impressive demonstration of SAC's bombing and firepower capability. Two B-52s each dropped 51 live bombs from terrain avoidance altitudes on desert targets below. "It was an impressive nighttime fireworks," said Capt Schmit. "You could feel the earth shake while you heard and saw the bombs exploding as they hit their targets!"

Our reconnaissance forces also contributed timely intelligence products to the battlefield commanders. Their involvement was the most extensive use of reconnaissance assets in the history of GALLANT EAGLE. The intelligence products were used by component commanders to make near-real-time battlefield decisions. Additionally, the products were rapidly distributed to combat units for inclusion in exercise play. Their efforts added immeasurably to the realism generated in the GALLANT EAGLE arena.

History records the numbers — sorties flown, bombs dropped, receivers refueled; however, the most important results of GALLANT EAGLE may never show on the "bean counter's" tally sheets — the thousands of hours of sleepless nights, the sweat, and just plain hard work that went into launching over 340 SAC sorties. The efforts required to place those bombs on target, put those tankers in the orbits supporting the Navy, Marines, and Air Force fighters, or the time required to launch the reconnaissance sorties providing data to fight a smarter battle would all go unrecorded. The real unsung heroes are the support members: security police, cooks, MWR, maintenance, billeting and countless other people whose contributions go undocumented, but not uncounted, in the final results. *Hats off to all participants of GALLANT EAGLE 86 — it moves us all a little closer to becoming trained warriors, capable of the challenge!*

ABOUT THE AUTHOR

A KC-135 instructor pilot with over 1950 hours, Maj Gary Dutelle is currently assigned to HQ SAC as a tanker operations plan officer. Other assignments have included positions as training flight instructor, contingency plans officer, HQ squadron commander and 3rd Air Division chief of training plans during tours at Andersen and Wurtsmith AFBs.

Project Warrior

A Question of Speed

Maj Ric Thiele
SIFC, Castle AFB

CROSS CHECK

Pilots have always been concerned with aircraft speed restrictions. There seems to be even more interest lately as we have been receiving an increasing number of questions concerning these restrictions. The following are three of the most frequent speed related inquiries received last summer.

Question #1: Several weeks ago I was being vectored for an approach in a busy airport traffic area. The controller requested that I increase my speed to 240 KIAS. Trying to please, I accelerated and maintained 240 KIAS. About 4 miles prior to the final approach fix the controller cleared me for an ILS approach. Here's where my problems began. When can I slow down to normal airspeeds and configure my aircraft? Since I didn't know what to do, I didn't do anything until I intercepted the glide slope resulting in "me and my elbows" trying to get the aircraft slowed, configured and descended at the same time. There has to be a better way of complying with the controller's instructions while providing a smoother transition to the approach.

Answer: The answer to your question can be found in the controller's handbook (7110.65). The first information that is given to the controller concerning speed adjustments (increase or reduction) is when NOT to give them to pilots. These are:

1) At or above FL 290 without the pilot's consent.
2) When flying a published high altitude instrument procedure.
3) When in a holding pattern.
4) When cleared for an approach.

Number four provides the answer to the question. Once a pilot is cleared for an approach, any previously issued speed adjustments are suspended. In the above question, as soon as the pilot was cleared for the approach, the increase in speed was no longer required, and the pilot should have slowed to the appropriate speed. Pilots are expected to make their own speed adjustments in order to complete the approach. If the controller still has a spacing problem he may reinstate the speed adjustment after providing clearance for the approach. Speed adjustments issued after approach clearance and accepted by the pilot are to be maintained until the aircraft reaches the final approach fix (nonprecision approach), fixes used in lieu of (precision approach), or 5 miles from the

runway, whichever is farther from the runway. If, in the above ILS approach question, an airspeed restriction had been reinstated and accepted by the pilot, it should have been maintained until the glideslope was intercepted. Controllers are supposed to minimize speed adjustments after issuing clearance for an approach. Pilots are expected to refuse a speed adjustment that is excessive or contrary to the aircraft's operating specifications.

Again, the pilot should have slowed when he was given approach clearance.

Question #2: I was given an airspeed of 300 KIAS to maintain by ATC. As I descend through 10,000 feet am I expected to slow down or can I keep my speed in excess of 250 KIAS with ATC's approval?

Answer: AFR 60-16 and FAR 91.70 are both explicit in saying that no person may operate an aircraft below 10,000 feet MSL at an indicated airspeed of more than 250 knots unless authorized by the Administrator (FAA). The military has been given authorization to waive FAR 91.70 for some type aircraft, while performing certain maneuvers, or while operating in certain defined airspace. Remember, an ATC controller is NOT the Administrator, and an ATC clearance does not constitute "authorization by the FAA." The controller's handbook (7110.65) says that pilots are expected to comply with FAR 91.70 when cleared below 10,000 feet MSL. It is not necessary to notify ATC that you are changing your speed, they expect it. The Airman's Information Manual (AIM) has some good guidance on this point: "Pilots are reminded that they are responsible for rejecting the application of speed adjustment by ATC if, in their opinion, it will cause them to exceed the maximum IAS prescribed by FAR 91.70(a). IN SUCH CASES, THE PILOT IS EXPECTED TO SO INFORM ATC." ATC does have authority to authorize pilots to exceed 200 KIAS within an airport traffic area, but not 250 KIAS below 10,000 feet MSL in airspace that is under the FAA's jurisdiction.

Question #3: Do you have to tell ATC if you are going to exceed 230 KIAS in holding? The old AFR 60-16 (5 Dec 80) required pilots not to exceed 230 KIAS when holding at or below 14,000 feet MSL. It also stated that you had to notify ATC when you were required to exceed 230 KIAS in holding due to flight manual restrictions or other factors such as turbulence, when at or below 14,000 feet MSL. The only guidance given in the new AFR 60-16 (10 Dec 85) is to consult FLIP GP. FLIP GP tells us not to exceed the maximum airspeeds as listed in Chapter 5. (See paragraph 5-25)

Since I didn't know what to do, I didn't do anything until I intercepted the glide slope resulting in "me and my elbows" trying to get the aircraft slowed, configured and descended at the same time.

Answer: No. As long as you don't exceed the airspeeds listed in GP for your aircraft, there is no requirement to tell Center if you are above 230 KIAS, regardless of altitude. The reason for telling ATC your holding airspeed when below 14,000 feet MSL was more for airspace separation than obstacle protection. ATC knows what your maximum authorized holding airspeed is, so they changed the rule requiring you to tell them your holding airspeed, unless (of course) you plan to exceed the speed listed in FLIP GP for your aircraft.

Now that the requirement for telling ATC has disappeared, you still need to realize that staying below your maximum authorized holding speed won't necessarily guarantee that you will remain in the holding pattern protected airspace. Most holding patterns are designed for at least an airspeed of 230 KIAS, so if you are able to hold at or below 230 KIAS you shouldn't exceed your protected airspace. But what if your aircraft requires an airspeed greater than 230 KIAS due to gross weight or design? How can you tell what airspeed (some are labeled, but most are not) the holding pattern is designed for? The only positive way is to look in the procedures package kept by the TERPs designer. Not too many of us fly with this package available, so you can ask the TERPs specialist at your base. But you can't spend your time calling up every TERPs specialist at every base you may fly into, so here's another way.

If slowing down is out of the question, compare the holding altitude to the minimum safe altitudes (both the minimum sector altitudes and emergency safe altitudes). If your holding altitude is above both of these altitudes, obstacles won't be a problem and you can hold at your maximum authorized holding speed and feel comfortable. If your holding altitude is below these you may have a problem. Look at the MSA sector circle on the procedure plate and see if you can stay inside one of the sectors and above its depicted altitude. If this is not possible, attempt to identify the obstacle/high terrain on a navigation chart and remain clear of it. If you can't accomplish either of these, your safest solution is to hold at or above the minimum safe altitudes (both emergency and sector) depicted. As a last resort you may ask ATC to help you stay away from the obstacles or terrain that is causing the problem; but remember, this is not one of ATC's priorities.

By not telling ATC our holding airspeed when it exceeds 230 KIAS below 14,000 feet MSL (this is where most of the obstacles are located) we are not really losing any services or protection. The controller knows your holding airspeed and if he isn't saturated you may get some assistance. But don't place the safety of your aircraft in someone else's hands when you don't have to. By doing a little prior planning, your holding pattern airspeed won't get you into trouble.

The phones have been busy. But for those of you who still have questions, give us a call at autovon 347-4571 and we'll do our best to find you an answer. **Fly safely!**

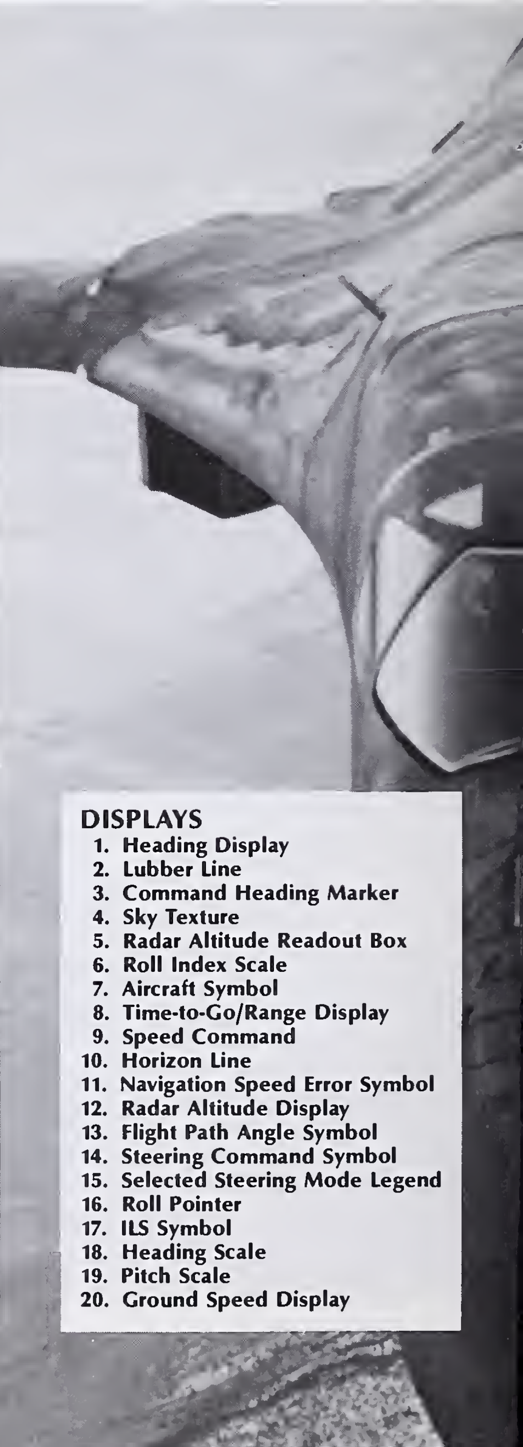
About the author. **Maj Ric Thiele is a 3,000 hour KC-135 IP assigned to SAC's Instrument Flight Course. In addition to his two and one half years at SIFC, his experience includes assignments at Castle, Kadena and Barksdale.**

FLYING THE FAST MOVING B-1B

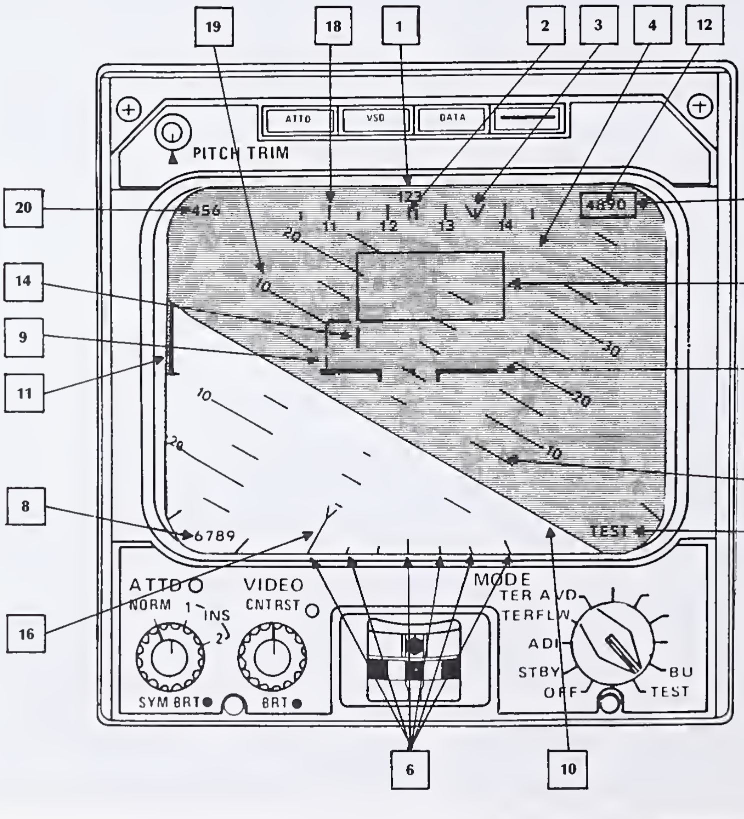
"Pilot, we're a little early, could you pull it back to 525 KTS?"

"Sure," says the pilot as he slows down from nine miles per minute to about eight and one-half. For those of us bomber pilots old enough to remember the term, "fast mover" referred to fighters or bandits in Southeast Asia. Now, the term "fast mover" is no longer associated only with fighters. As aircraft technology advances, so must we crew members. A generation ago, aircraft speed did not exceed 200 KIAS, and today, a no-flap B-1B lands at speeds in excess of 200 KIAS. A lightweight B-1, (230,000 pounds) leaps off the runway with more than 120,000 pounds of thrust from its four F-101-GE-102 dual rotor, afterburning, turbofan engines. The days of 10,000 feet takeoff rolls have been replaced with takeoff rolls one-third of that.

There is nothing slow about the B-1B. This computer-aided flying machine is able to make thousands of



VSD SYMBOLOGY



DISPLAYS

1. Heading Display
2. Lubber Line
3. Command Heading Marker
4. Sky Texture
5. Radar Altitude Readout Box
6. Roll Index Scale
7. Aircraft Symbol
8. Time-to-Go/Range Display
9. Speed Command
10. Horizon Line
11. Navigation Speed Error Symbol
12. Radar Altitude Display
13. Flight Path Angle Symbol
14. Steering Command Symbol
15. Selected Steering Mode Legend
16. Roll Pointer
17. ILS Symbol
18. Heading Scale
19. Pitch Scale
20. Ground Speed Display

decisions each second. The only "slow" aspect of the B-1B is the crew. It's tough to fly two low levels, an air refueling, an hour of airwork, and then stay ahead of 200 KIAS approaches in the pattern.

Times are changing and the equipment is changing too. One of the unique changes within the B-1B is the vertical situation display (VSD). We older guys used to fly using attitude indicators. Now we fly while utilizing a TV-like scope that makes an ILS approach seem similar to the video games of Tron and Space Invaders. The VSD provides a cathode-ray tube display of attitude, heading and steering parameters. In addition, terrain following and terrain avoidance radar data is provided when selected. Information is displayed by movement/positioning of alphanumerics and other symbols. The VSD receives data from the bomb nav system, the flight director computers, the central air data computers, the ILS, TACAN and radar altimeter.

I suppose that this cosmic-computer technology is necessary to ensure that the pilots will keep in stride with the aircraft. It is great fun to tell bomb plot personnel that my distance from a target is exactly 22.7 miles. When I am traveling 500 to 600 miles per hour, it is a terrific feeling to know my distance to the turn point in tenths of mile measurements. Altitude is printed in one-foot increments which is certainly critical information for us low flyers. Somebody, somewhere, was wise enough to know that if the B-1B pilots were going to be able to make their TOTs then the ground speed would need to be projected on a scope. At the top of the screen, I receive a three-digit heading readout with a marker to keep me straight. I have a pitch scale that accurately portrays a degree in pitch change. The speed command works like an angle of attack indexer, and the navigation speed error symbol indicates speed changes required to make a preplanned flight time. The ILS superimposes a miniature aircraft symbol within a rectangular box which portrays both azimuth and glide slope. Crosshairs are also shown to direct you vertically and horizontally.

The days of VORs are gone. Crew members and staff officers involved with the flying machines of today and the future must be disciplined and very skilled if they will continue to safely operate the new generation of "air breathers."

ABOUT THE AUTHOR

Since entering the Air Force in 1970, Maj Michael Allen Kenny has amassed over 3300 flying hours, including 678 combat hours. Prior to his arrival to Dyess AFB and the B-1, Maj Kenny was chief of the FB-111A Central Flight Instructor Course.

ABORT-ABORT-ABORT!

Capt John L. Furr
68 AREFG/SE, Seymour Johnson AFB

There you are, ready for a nighttime heavyweight launch. Naturally, the weather is crummy; light snow is melting as it hits the runway, and base ops has just changed the RCR to wet. But you're ahead of the game, for you have already prepared wet runway takeoff data in case something like this happened.

Time to taxi, take it easy on the throttles so you don't create any more thrust than you have to. Before takeoff checks complete, takeoff clearance received, start the timing. Power's good — good acceleration — LOUD THUMP — what was that?

Engines still good — (tower reports smoke from gear). Still below V-1.

"Abort!"

As you hear yourself say it you begin doing the items you've been trained to do a thousand times — brakes all the way to the floor, throttles idle, spoilers, reversers. Wait a minute, the deceleration doesn't seem to be there.

You look over to the copilot who is busy making radio calls and then back to the runway — four thousand remaining and 115 KIAS. This is gonna be tight, you don't feel like you're decelerating like you should be. Hydraulics are good — LOUD THUMP — you've lost another tire. "Aw ____ ."

The CO sounds nervous when he says, "Two thousand feet." Still doing 90 KIAS? What's wrong? Too fast for the hammerhead, we'll take her into the overrun.

"Crew, prepare for emergency egress; CO, tell tower we're going off the end." Time begins to crawl, legs ache from standing on the pedals. With a sickening lurch, you stop. "Let's get out of here!" Engines off, battery off, everyone off? Outside it looks odd, sitting at an angle, brakes smoking. What happened?

Sounds like a sweaty palms nightmare doesn't it? Here is a pilot who did everything "right" and he's still off the end of the runway with his aircraft sinking into the mud. Let's face it, even though many inherent hazards associated with the aborted takeoff have been somewhat alleviated by improvements in braking systems, extended runway lengths, and in the case of wet runways, by runway grooving porous surfaces, the takeoff energy levels generated by modern heavy jets continue to make the abort a critical operation. In aborting a takeoff, for whatever reason, the operation becomes similar to a landing after touch down in that all efforts are devoted to bringing the aircraft to a safe stop on the remaining runway. Although similar to a landing relative to the mechanics involved, the abort occurs less frequently, and is generally more critical than the landing in terms of stopping the airplane. This is due to the following factors:

(1) Aborts usually occur at higher aircraft gross weights than landings.

(2) Aborts often take place at higher speeds.

(3) By the time a problem is recognized, the decision made to abort the takeoff, and abort action initiated, there is usually much less runway available in which to bring the aircraft to a safe stop.

(4) Most tire failures (FAA estimate: 75%) occur during takeoff. Relatively few happen during landing. Tire failure can, in fact, cause the takeoff to be aborted and thereby initiate a series of events which significantly reduce the stopping capability of the aircraft at a time when it is most needed.

(5) Murphy lives — "If anything can go wrong, it will do so at the worst possible time."

One policy tends to alleviate the critical nature of aborts. The use of reverse thrust or a drag chute is usually not permitted in testing or in accelerate-stop data used for planning purposes. However, this data is also excluded from landing data.

For those of you hoping to get a "book solution" to this problem — forget it. The pilot in charge at the time must make the best decision he or she can. The high speed heavyweight abort is just one of those cases. What is offered is food for thought and a challenge to get more involved with the physics and mechanics of your aircraft so you are more prepared to make the right choice when faced with a similar dilemma.

The loss of a tire on takeoff roll can raise some interesting questions:

- Was the brake locked, (have I traveled farther because of the locked brake before it blew)?
- Does my antiskid system sense no rotation in a blown tire (and reduce brake pressure on another paired brake)?
- Did I blow a tire or two (or was that a compressor stall)?
- Did the blown tire FOD an engine (or damage other brake lines)?

All of these are valid questions which will affect the outcome of the abort and must be decided in an instant, but the two most important questions to consider on mission planning day are: how much does the loss of a brake or two affect my stopping distance in a high speed, heavyweight abort, and how does an RCR of 10 or 5 coupled with loss of braking affect my stopping distance? Time spent looking this up can pay massive dividends should the occasion arise to use it.

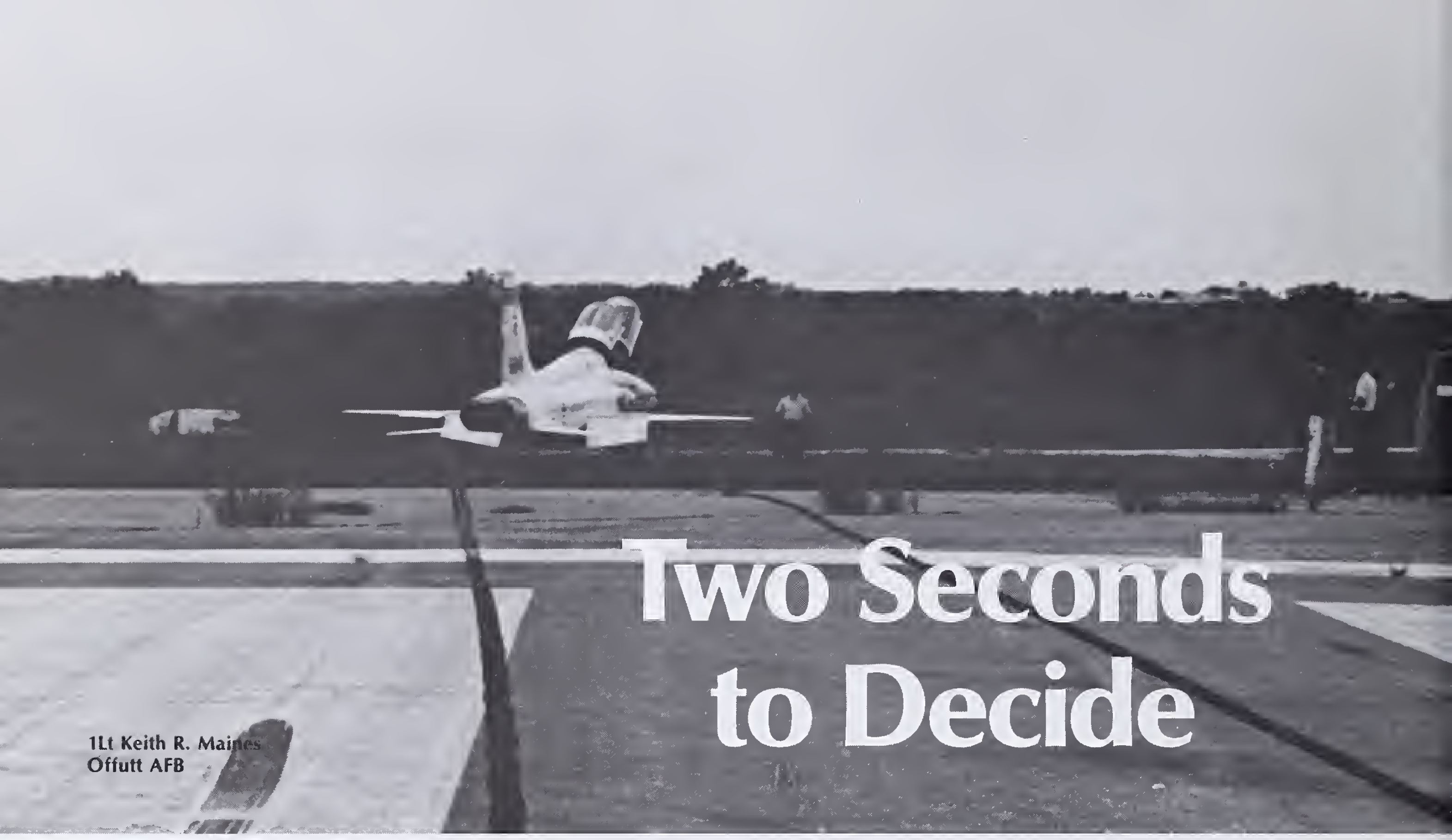
As final food for thought, consider two mishaps; the first, a B-52 at a northern tier base whose front gear began to retract when past S1 timing, i.e., committed. He could neither accelerate because of the scrubbing motion of the tires nor could he successfully abort because of the lack of braking. After a harrowing slide down the runway on his nose, the plane stopped off the end of the runway and the crew successfully egressed.

Another mishap involved a commercial DC-10 at JFK International in 1975. During takeoff, birds were ingested and fire developed in the No. 3 engine. The takeoff was rejected well below V1 on a wet runway, several tires blew, reverse thrust was used on two engines, the aircraft ran off the end of the runway and was destroyed by fire. Passengers and crew evacuated safely.

These two examples point out that at the worst possible moment a combination of events beyond our control can put us off the end after an aborted takeoff. Be ready to react; and be ready to evacuate yourself and any others who are on board your aircraft . . . every time you take off.

About the author.

Capt John L. Furr is a KC-10 pilot with over 3300 hours in B-52 and KC-10 aircraft. He is currently serving as Chief of Safety for the 68th AREFW, Seymour Johnson AFB, NC.



Two Seconds to Decide

1Lt Keith R. Maines
Offutt AFB

"The T-38 Talon veered from a Lincoln runway and stopped undamaged in a grassy area beyond the landing strip, said an Offutt spokesman." Indeed, the press report in the Omaha World Herald even provided a picture of the "undamaged" jet.

It was strange to read about the incident later in the newspaper. It was certainly humorous to read how the airplane "went out of control," as the article implied, simply because one of the engines ingested a bird.

Capt John Rome and I learned a lot from a few critical seconds. We developed a new understanding of what "critical phase of flight" really means, and we also saw firsthand the benefit of crew effort.

Since the ACE instructor pilot told us that morning that I needed a circling approach for my quarterly requirement, we decided I would fly in the front seat and John would fly in the back.

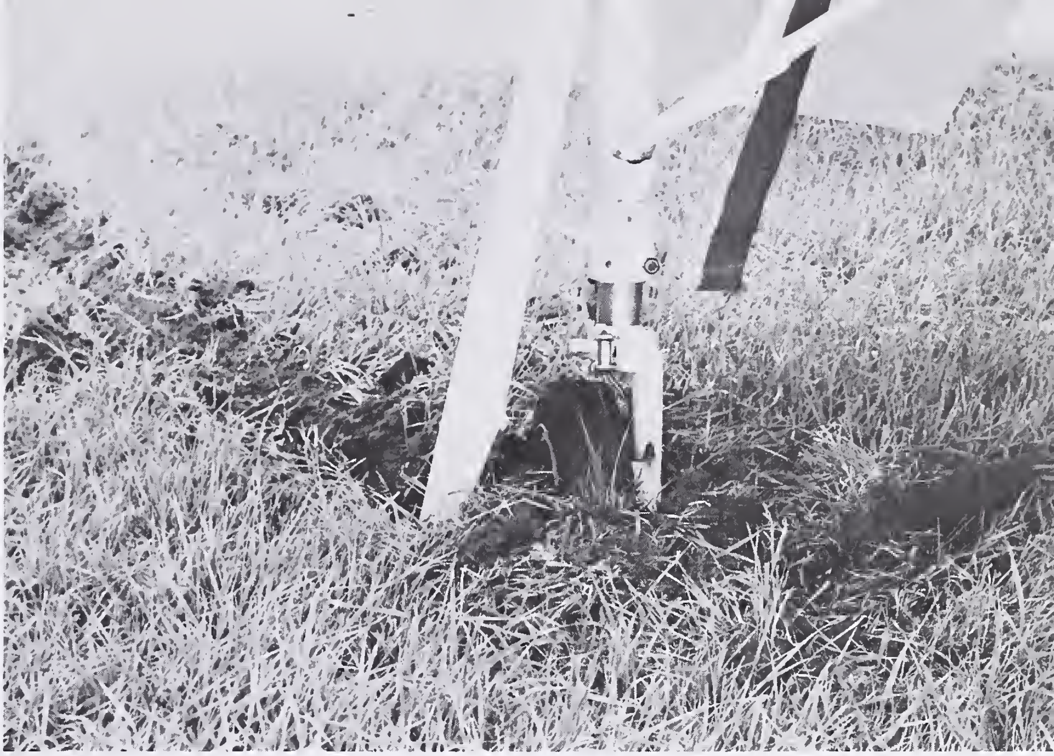
When we arrived at the plane, John did the walk-around while I strapped in and got our clearance. Rye 06 was "cleared as filed" to Lincoln, where we planned to do some instrument approaches and the required circling approach.

John accomplished the takeoff from the back seat and flew us over to Lincoln. The second approach was mine. I planned the approach to Runway 35, circle to a touch-and-go Runway 32. We were circling to the shorter runway, but it was still 178 feet longer than the 8000 feet minimum required by ATC regulations.

I landed in the first 1000 feet, though barely, and I pushed the power up for the takeoff. Since it was essentially an on-speed touchdown of 145 knots, we were still at about 140 knots as our engines spooled up. Suddenly, I could see we were going to penetrate a small flock of "dove-sized" birds. I had been through bird flocks before, but had always had the good fortune of missing them; the loud bang of a bird striking our T-38 told me I hadn't been as lucky this time.

As I started to feel the thrust of the engines as they raced through 90 percent RPM, I suddenly felt almost none (the loss of one engine felt like more of a loss than just half of the thrust available). I reacted to the loss by bursting both throttles to MAX afterburner (the first step in the bold face for continuing the takeoff), and took a one-second glance at eight of the main engine instruments, all of which were in motion. The number one engine was stabilizing at military power; while the number two engine had completely flamed out, its RPM rolling back to zero percent. With only a one-second glance, my analysis was almost more of a feeling than a concrete understanding; however, it was confirmed by the other pilot.

All at once we were in the middle of the "grey area" of procedure versus pilot judgment. It was what I now realize to be the most critical moment in this "critical phase of flight." We had to make a decision but the questions were too numerous to consider in the approximately two seconds we had. The most critical question: Was the unaffected engine really unaffected? Did the number one generator bus crossover to the number two electrical bus, allowing us to retract (from 100% to 60%) our flaps? Did we suffer other damage as we went through that flock? Also, did we have enough runway left to continue the takeoff or should we stop?



As the T-38 slid to a stop 146 feet off the pavement, the right main wheel gouged a rut up to the wheel bearings.

The one question we had to answer immediately was whether to continue the takeoff or stop? Almost instantaneously I made my decision and had already begun to execute it, but where there are two pilots, there will be two opinions, and the pilot in the back offered his: abort the takeoff.

Not feeling any response from the afterburner yet, I took his suggestion. THROTTLES — IDLE; WHEEL BRAKES — AS REQUIRED. Wheel brakes were required, now, even while I was beginning to pull the nose up to the 12 degree nose-high aero-brake attitude. However, I would have to brake lightly, since I was 20 knots faster than the recommended braking speed; locked wheels or tire skids would be difficult to recognize, and brake fires were possible. Brake fires aside, the end of the runway was fast approaching and I intended to stop this five and one-half ton hurtling mass of steel, magnesium and aluminum. As our speed decreased, my brake pressure increased such that by 100 knots I was "standing" on the brakes (as was John as I later found out).

As it soon became apparent that we would "depart the prepared surface," I disengaged the throttle gate, and as we went off the end, I pulled both throttles to cutoff. Making three inch ruts in the grass increased our deceleration, and we stopped 146 feet off the pavement. John made a quick radio call to the tower telling them of our predicament, after which I turned off the battery switch and we both jumped out and started running. Almost immediately, we realized that all was quiet so we returned to the jet to look the scene over.

We had skidded the last 500 feet of the runway, blown both main tires, and ground off part of one main wheel. No other damage occurred to the plane except bird damage to the number two engine.

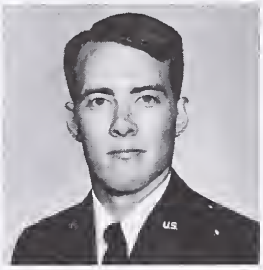
So what did I learn? First, I saw how important it is to land in the first 1000 feet of the runway. Before this incident, I reluctantly admit that I have all too often accepted long landings thinking I would just correct the next one. I now realize that having your throttles at idle and slowing to touchdown speed is what really makes a touch-and-go so critical — not touching the runway. If it is going to be a long landing — go around. It is much better to have flying airspeed with your throttles already in military if something happens.

A surprising discovery concerning the T-38 is that landing in the first 1000 feet of the runway is more important when doing a touch-and-go than it is when performing a full stop landing. Even for the heaviest landing weight, I could have landed 2000 feet down the runway and still stopped by the end, had I been executing full stop landing procedures from the beginning.

Secondly, I learned that engine failure on a touch-and-go is an emergency which calls for almost immediate action. You have to think about what you will do before it happens. I am not saying do not "analyze the situation," rather, I am suggesting that you have your decision already made, based upon distinct conditions. Also, the fewer the variables, the easier it will be to make a quick decision.

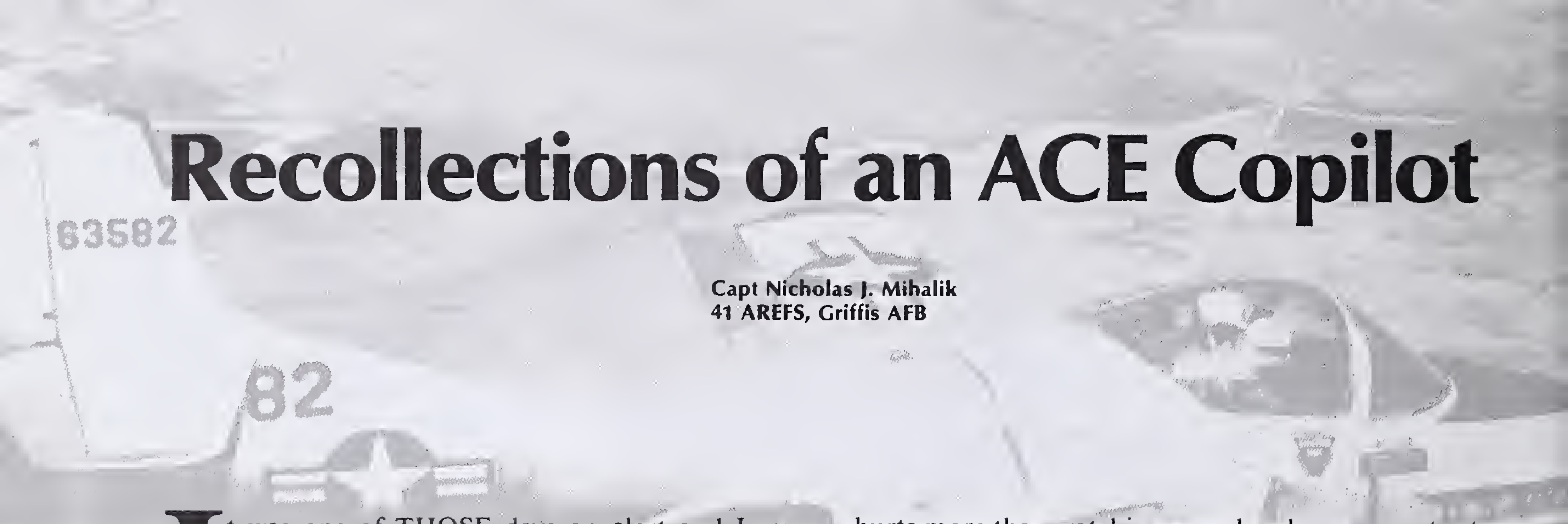
For example, if you lose an engine on a VFR day you might decide that all you need to consider is whether or not the other engine is working normally and establish its condition by checking the RPM and EGT gauges. On the other hand, depending on runway length, outside air temperature and IFR conditions, you will have to give consideration to other things such as electrical crossover. (Don't forget to decide what you will look at to determine that electrical crossover has occurred.)

Finally, if you have another pilot, he can help analyze the situation. In a time compressed emergency, another pilot who is not involved in flying the aircraft can verbalize his analysis, expanding or confirming the flying pilot's analysis. The pilot not flying the aircraft can also back up the other as he executes the boldface.



About the author. 1Lt Keith R. Maines graduated from the Air Force Academy in 1983 with a B.S. in Civil Engineering. After completing UPT and then combat crew training in the KC-135, he arrived at Offutt AFB in January 1985 where he is currently assigned as an EC-135 copilot.

Recollections of an ACE Copilot



Capt Nicholas J. Mihalik
41 AREFS, Griffis AFB

It was one of THOSE days on alert and I was taking a break from the seemingly endless flying safety projects that seemed to occupy my waking hours. Suddenly, there it was, floating over the threshold, a T-37. I could almost feel the way it skipped along the runway and for a few moments I was there holding the nosewheel off as the power came in with the speed brakes coming up. The aircraft broke ground and with 100 knots the gear came up along with flaps shortly after. As the "tweet" passed out of view, I couldn't help but remember all the experience and fun derived from the ACE program.

As a young copilot at Grissom AFB I thought I knew a lot about the ACE program before I was enrolled. However, I was still amazed that I would be able to set out with another copilot for a day or weekend of flying after completing my training. The ground training consisting of systems, emergency procedures and egress review was soon followed by a series of contact rides. The stalls, falls, and spins were frustrating in the beginning, but after a few rides, I started to feel comfortable. With the contact check behind me it was time for instrument work. I soon realized that the Collins 109 flight director in the KC-135 had spoiled me. My first instrument sortie was spent trying to build a crosscheck. While flying a PAR my instructor kept telling me to cut my rate of descent. I told him I couldn't. When he asked why, I told him that I couldn't find the VVI! The procedure turns and teardrop penetrations were a far cry from the enroute descents and radar patterns which dominated tanker instrument work. But this diversity in flying experience which ACE offered is the hallmark of the program.

With my instrument check completed, I started to explore the various airports available for our use throughout the Midwest. Although the T-38's have much longer legs, a T-37 has the advantage of being able to go into a larger variety of airports. An airport with 5000 feet of runway and a military tenant became new territory to conquer. The teardrops into Wurtsmith, the landing illusion over the ravine at Charleston, West Virginia, and the sidestep localizer at Cleveland Hopkins were just a few of the aviation challenges which made ACE so rewarding.

Of course, there were frustrations too. Nothing hurts more than watching a weekend cross country to Florida blow up in your face because of reported icing from the surface to FL 600. Or how about the last hop of a long cross country when number one wound up fine but the number two engine starter switch fell out of the panel and into your hand. You looked at your partner, wondered if it was possible to hot wire a jet engine, and then helplessly trudged back to base operations to tell the home drome that you're stranded someplace that you would rather not be. And finally there were those days when you had an airplane and the time but nobody else was available to fly. That's real depression.

There is a keystone in all the rambling that I've done in these few paragraphs. That keystone is experience. There may be no other period in your flying career in which you will gain so much experience in so short an amount of time. At UPT and CCTS you were trying to get a handle on flying. After upgrade you'll polish your skills in one specific aircraft. But in ACE you'll hold qualifications in totally dissimilar aircraft at the same time. Not many flyers can make that claim. Along with the experience comes responsibility, confidence, and air sense. Make good use of this opportunity. It may involve sacrificing some free time, but I guarantee that the effort will pay dividends in the future. Go out there, enjoy, and take it from one who knows: where ACE is concerned, you don't know what you've got . . . 'til it's gone!

ABOUT THE AUTHOR

Capt Nicholas J. Mihalik is a KC-135 aircraft commander in the 41 AREFS at Griffiss AFB. After graduation from UPT at Laughlin AFB, and completion of CCTS at Castle, Capt Mihalik spent three years at Grissom AFB as a tanker and ACE copilot in the 305 AREFS.

Safety in the Missile Procedures Trainer

Capt Raymond H. Sims
3901 SMES, Vandenberg

The missile procedures trainer (MPT) is an electronic simulator built to both resemble and operate exactly like the operational launch control center (LCC). With few exceptions, the trainer, or "box" as it is sometimes called, is an exact replica of an operational LCC. Unlike other operations jobs that allow the crew member to practice crew procedures directly on the equipment of his/her weapon system, the missileer must rely on one of the four MPT configurations in SAC to provide the only realistic means to develop and perfect the job skills required for mission readiness. The loss of even one of these multimillion dollar simulators would pose serious problems to crew member proficiency at the base where the loss occurred. Because the MPTs play such an important role in honing the skills of the cutting edge of our nation's deterrent force, the readiness of these assets is paramount.

A vast array of electrical components enable the MPT to perform its simulation functions. As with any large, complex piece of electronic equipment, the potential for fire caused by a malfunctioning electrical component is constantly present in the MPT; and those who work in the MPT must know to respond to emergencies such as fire. The MPT maintenance technicians are the front line defense in the fire prevention effort. These talented men and women keep SAC's MPT force running safely, and at an impressive 95 percent commandwide average in-commission rate. The technician's role in MPT fire prevention cannot be overemphasized. Because their duties focus on the maintenance of the MPT, the technicians are in an ideal position to detect and eliminate hazardous conditions. The actual operation of the MPT is the responsibility of the missile procedures trainer operator (MPTO). This staff officer ensures the trainer performs as programmed and is responsible for the safe conduct of the training/evaluation session. With this in mind, here are a few points for the MPTO.

There is no substitute for becoming well versed in all aspects of the trainer's operation. One of the best MPTOs I ever knew would always say the operator must be smarter than the machine. The only way to be smarter than the machine is to study it. Experience gained as a combat crew member establishes a solid foundation to begin to understand the MPT from an operational standpoint. This crew experience, combined with aggressive study of the theory and function of trainer-unique equipment, will pay large benefits throughout an MPTO's tour of duty. From a safety standpoint, knowing how the trainer functions allows the operator to readily detect malfunctions. Before starting a shift the MPTO should review maintenance discrepancy forms for any discrepancies that could affect the safe operation of the trainer.

The MPTO must stay alert. As mentioned earlier, the command's average MPT in-commission rate is 95 percent. With this type of reliability, it's very easy to be lulled into a false sense of security. That point reminds me of an incident that occurred on one of my shifts as an MPTO. I was giving a training script for what seemed the one hundredth time. The operator's cab was cold, so I had pulled the acoustical curtain to isolate me from the full effects of the air conditioning system. As I closed the curtain, I smelled an acrid odor. But since the odor did not last very long, I dismissed it and continued the mission. When the odor recurred, I opened the acoustical curtain and found the odor had filled the rest of the cab area, and was much stronger. Something was burning! I directed the instructor and student crew to evacuate as I performed an emergency shutdown. Our maintenance technicians later found a charred circuit card in one of the communications equipment racks. That incident gave me a greater respect for the MPT. It taught me to question things which are abnormal but seem minor. I also developed the habit of leaving the acoustical curtain open slightly, no matter how cold the operator's cab became. This would increase my chances of detecting any malfunctions in the equipment located adjacent to the operator's cab.

That incident illustrates still another point. Communications between the operator and the instructor/evaluator on the floor are important. By design all MPTs have a cab or operator area and student area. Depending on the type of malfunction and the area of the MPT involved, some people in the MPT may not be able to tell when something is wrong. In my situation, the people in the student area had no idea anything was wrong until told to evacuate because the fire occurred in the operator area. It's a good idea to tell the instructor before the ride starts to let you know when anything seems out of the ordinary. The key here is effective communication.

My final point is the importance of knowing emergency procedures. An emergency is not the time to ponder if step X is being performed correctly. If a fire or any other emergency occurs, those present must have a crystal clear understanding of emergency procedures relevant to the situation. Sound instruction of these emergency procedures should be an active part of both initial and recurring training programs for maintenance technicians and operators. Knowing the procedures is essential for quick execution.

The MPT is an important command asset. The combat crew force learns and maintains mission essential skills through simulation. This simulation capability is enhanced through the use of safety practices, designed to prevent loss or damage to the MPT as a result of mishaps.

About the author. Capt Raymond H. Sims is Chief, Missile Procedures Trainer (MPT) Section for 3901 SMES. His previous assignments were Missile Combat Crew Member, MPT operator and Assistant Chief, MPT branch at the 90 SMW. He was also Chief, MPT branch at the 4315 CCTS. He holds a B.A. in speech pathology from the University of Florida and is a graduate of both SOS and ACSC.

PROFESSIONAL PERFORMERS

Flying Crew

Maj Alan C. Pickering, AC Crew E-11, Lt Col Jerry A. Gossner, 509 BMW/DOV, and Capt Bruce J. Kennedy, AC Crew S-04, make up SAC's Flying Crew of the Month.

While performing Supervisor of Flying (SOF) duties recently, Maj Pickering was monitoring an FB-111A simulated single engine approach flown by Lt Col Jerry Gossner and Capt Bruce Kennedy. During the landing and prior to takeoff Maj Pickering saw smoke or fuel trailing from the left side of the aircraft. He radioed the crew advising them to discontinue the takeoff. The two Stan/Eval pilots immediately aborted. As the crew turned off the active runway, Maj Pickering called for fire department and crash crew assistance from his SOF vehicle. He then confirmed a massive fuel leak pouring out the back of the aircraft and told the crew to shut down both engines. The aircrew turned the aircraft into the wind before shutting down the engines to prevent fuel from blowing on hot wheel brakes. Both pilots quickly egressed after placing the throttles to off and depressing the fire push-buttons. The fire department arrived to wash down the leaking JP4 preventing a further fire hazard. Maintenance investigation revealed the cause of the leak was failure of the exhaust nozzle pump in the afterburner fuel section. Cockpit indications informing the crew of this malfunction were never present. Maj Pickering's decisive judgment as Supervisor of Flying combined with Lt Col Gossner's and Capt Kennedy's timely reactions prevented the loss of a valuable resource and averted a possible disaster.

Missile Crew

Crew R-052, 1Lt Gilbert O. Classen, MCCC and 2Lt David C. McCormick, DMCCC, 321 SMW, Grand Forks AFB, is SAC's Missile Crew of the Month.

While on strategic alert recently, Crew 052 encountered several potentially serious situations requiring outstanding weapons system knowledge and sound professional judgment. These potentially serious situations included a severe weather warning which required diesel start up, a missile alignment problem and diesel failure in the LCEB. Security indications on eight LF's required immediate dispatch of the ART. Zero visibility and funnel clouds forced the crew to direct the ART to take cover in the LF equipment building. After the severe weather passed the crew insured the LCC and LF's were brought back on commercial power, and all security situations were cleared.

Missile Maintenance

SSgt Laurie A. Kember, 321 SMW, Grand Forks AFB, is SAC's ICBM Maintenance Airman of the Month. Assigned to the training management branch, SSgt Kember was selected as a SAC IG "professional performer" for developing a monitoring system to track training deviations and more accurately portray ineffective scheduling efforts. She was selected as a 3901 SMES "outstanding performer" for her observation and critique of in-shop training which was a leading factor in the 100 percent pass rate of trainer proficiency evaluations. Selected as a "noteworthy performer" by 15AF for her error-free training forecast, she went on to be named in the SAC IG report for 1986 for "energetically encouraging and assisting the in-shop instructors in the improvements of technical training lesson plans." Her error-free program and professional performance directly contributed to the Excellent rating the Training Management Branch received during the SAC IG visit. SSgt Kember was a key contributor to the design and implementation of the Training Management Branch's new Learning Center. Her accomplishments as the Maintenance Systems Manager in charge of all training programs in the learning center and in-shop training programs, were the driving force behind the "excellent" rating earned from the recent activity inspection.

Munitions Maintenance

Sgt Bret A. Forsberg, 93 BMW, Castle AFB, is SAC's Munitions Airman of the Month. Assigned to weapons maintenance, Sgt Forsberg is a highly qualified technician and NCO who performs magnificently. During a recent ORI, Sgt Forsberg's motivation and quick breakout actions enabled the acceleration of all other wing actions and 17 of 22 B-52 bombers to achieve bonus points. When an air leak was discovered on a loaded MHU-7/M trailer during weapons breakout, Sgt Forsberg played a key role in downloading the weapons, uploading them on a substituted trailer and getting the convoy back on schedule. These actions allowed the aircraft to be generated ahead of timing parameters.

Aircraft Maintenance

TSgt Jamie A. Stephens, 42 BMW, Loring AFB, is SAC's Maintenance Airman of the Month. Through the application of his managerial abilities and resevoir of technical knowledge, TSgt Stephens revitalized the integrity and effectiveness of a static Precision Measurement Equipment Laboratory (PMEL) Quality Assurance (QA) program; as the recent excellent rating from a recent MSET inspection indicated. As the Test, Measurement and Diagnostic Equipment (TMDE) branch equipment account custodian, TSgt Stevens is responsible for approximately one million dollars worth of accountable equipment. After indepth analysis of PMEL TMDE requirements, he initiated management actions to turn in 48 items of excess TMDE valued at $80,000. His actions provided critical assets to other Air Force activities and significantly decreased the PMEL workload. Also his analysis identified 15 additional TMDE requirements which increased PMEL's lateral support capability. These management actions had a direct, positive effect on the 42 BMW's overall mission effectiveness.

TACTICS

Dealing With the Enemy Threat

Capt James F. Whitney
530 SBTS, Plattsburgh

“**BREAK, BREAK . . . damn,** I wish I had learned a little more about tactics. Red Flag showed me a lot about what to do during a wartime situation, but that was nothing compared to this! My countermeasure receiver set looks like a Christmas tree.”

History has proven time and again that old tactics and old ideas kill people. The Maginot Line comes to mind. Hitler’s armies in WWII pulverized the old WWI static line defense by using a blitzkrieg, the old end run. The French were ill-equipped for this kind of maneuver and paid a heavy price. Each of you can probably think of a similar situation in which those who weren’t prepared paid the consequences.

By this time you’re saying to yourself, “So what, what’s the point?” Remember Red Flag? Speed for the FB-111 works extremely well at getting away from an enemy threat. Yet how long can you sustain that speed? In afterburner you’re guzzling between 30,000 to 50,000 pounds per hour per engine of that precious commodity. It doesn’t take a genius to figure out that it won’t last long. Don’t put the magazine down yet, there is a Lone Ranger on the horizon with a regulation that can help — SACR 3-1, Mission Employment Tactics. Following are a few interesting (and of course unclassified) ideas that will help. They’ll deal with the descent, low level and low level exit portions of your mission.

Probably the most difficult phase of flight in a threat environment will be getting from the high altitude regime to the low altitude environment. SACR 3-1, Volume VIII, FB-111A Tactics, gives direction to help FB-111 crews get the pointy end of their aircraft pointing down. Of course you need to get your wings back (as appropriate) and pick up airspeed. And FOLLOW SACR 3-1 PROCEDURES! Now that you are screaming at the ground, how do you get leveled off? Figure 1 shows for:

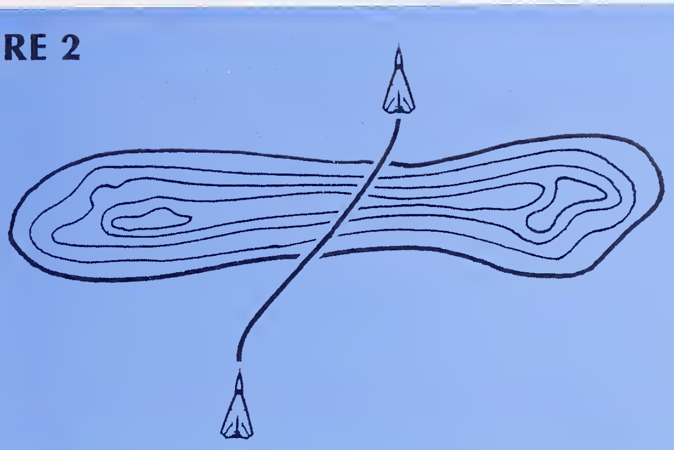
75,000 lb gross weight
550 knots TAS
54 wing

using a 3G pull-up (Approx 8° AOA) you would need 2,100 feet with NO SAFETY MARGIN! Of course if you let the TF's fly you up, you'll need more altitude. Once you are leveled off at the appropriate altitude and airspeed you're in your realm.

"You've escaped the first threat, but how do you stay hidden." The first rule of thumb is simple: fly only as low as required. "Over flat terrain, most threats do have a low altitude capability, and will force you to your minimum altitude capability. However, as the terrain gets rough, the threat minimum altitude starts increasing, and so should your altitude." (SACR 3-1, Vol VIII). Trying to fly extremely low will only increase crew fatigue if the threat doesn't dictate that type of reaction. Again, fly only as low as required. Your advantages are the camouflage paint scheme and the use of terrain masking as depicted in Figure 2. Notice how the aircraft is using the saddle of two ridges to hide.

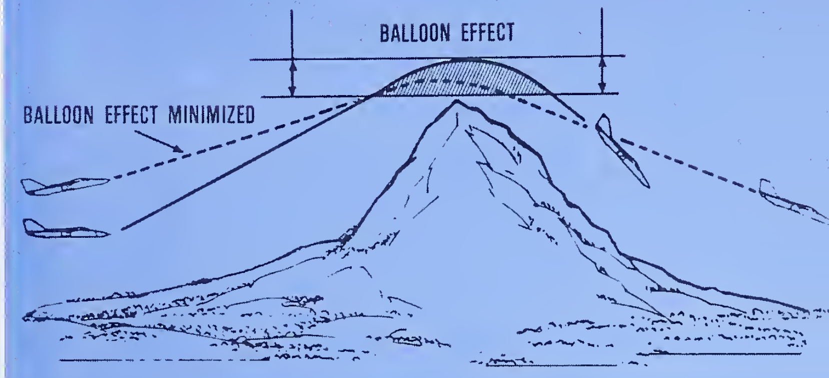
In mountainous terrain, place your aircraft behind ridge lines at the military crest level. Avoid lines of communication such as waterways, roads, railroads, or populated areas. Prominent terrain features should be avoided, since they probably contain enemy defenses looking for you. In most cases, 10 to 20 knots above planned airspeed will compensate for the added distance flown.

FIGURE 2



UNCLASSIFIED

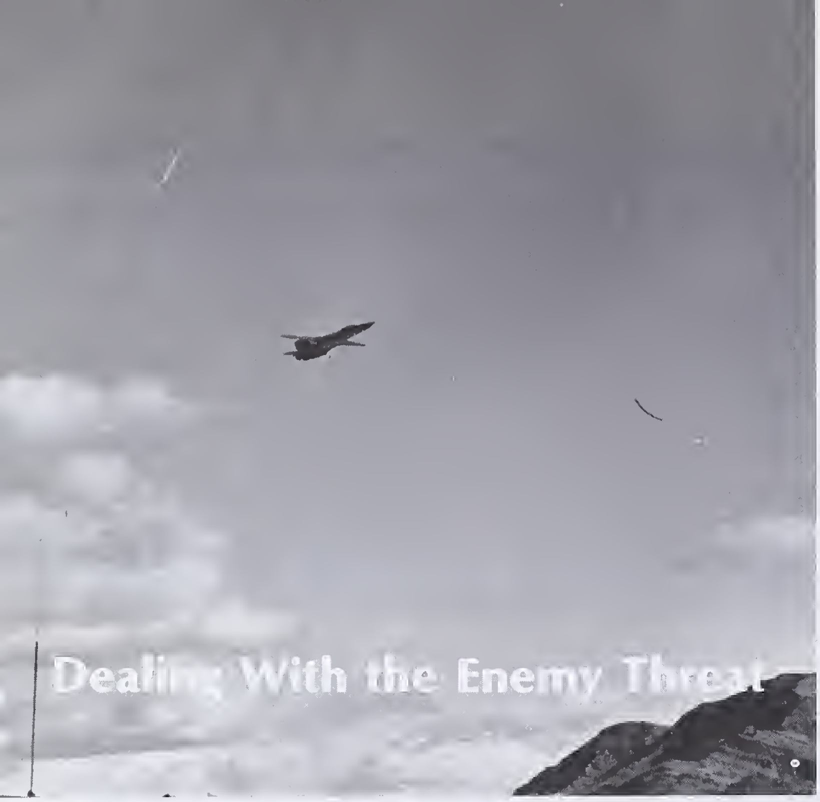
FIGURE 3



UNCLASSIFIED

FIGURE 1

(at 8° AOA)	20°	30°	45°
	ALTITUDE REQUIRED (FEET)		
60,000 pounds gross weight			
500 (3.1)	900	1,700	3,900
550 (3.8)	800	1,600	3,300
600 (4.6)	750	1,600	3,400
650 (5.4)	700	1,500	3,300
75,000 pounds gross weight			
500 (2.4)	1,100 (900 @ 3 Gs)	2,600 1,800 @ 3 Gs)	5,000 (4,000 @ 3 Gs)
550 (3.0)	950	2,100	4,800
600 (3.6)	900	2,100	4,400
650 (4.1)	1,000	2,200	4,200



Ridge crossings are another problem area. Your aircraft may be highlighted to threats, especially the optical type, when it balloons over the top of a ridge. For this reason, avoid ridge crossings and try to terrain mask. If it becomes necessary, try to keep your exposure to a minimum by starting your climb early and crossing the ridge in level to slightly descending flight. This will cut down your exposure on both sides of the ridge (Figure 3). Flying towards the ridge and starting a high G pullup will cause the aircraft to balloon over the other side highlighting your aircraft by both radar and optics. Since you've just flown through the valley of death and know what's on that side but you don't know what's on the other side, the benefits of this type of maneuver become apparent. Hindsight is always 20-20.

A lot of discussion has been generated as to whether you should roll and pull over the other side of the ridge or push-over (bunt) at approximately 0 G's. A roll and pull down gives the smallest turn radius. Use a maximum of 135° of bank, and don't bury the nose. The disadvantages are the wing flash, and the possibility of becoming disoriented. The disadvantage of the bunt is anything that is not stowed securely will float to the front of the aircraft. Being IFR in the cockpit could be extremely disorienting at low level. In either case, don't let the aircraft lose too much airspeed; and as a guide, don't use more than 20° nose down. The PK of the ground is usually 1.0!

New technology, specifically the pulse Doppler radar, looms on the horizon. Have you ever heard a baseball announcer say, "The pitcher is starting to fade a little. That last pitch was only 85 mph?" Where did he get that information? Somebody was clocking the ball with a Doppler radar located behind the plate. For pulse Doppler to work, the target should be coming right at the gun. If you try to use it on the beam (to the side) the narrow beam width along with the false error from swinging the radar gun trying to track the ball will complicate the solution. This new technology is currently being deployed. If you can get on the beam of this type of radar, you can really complicate the tracking solution. For defenses against this system and for specific maneuvers to perform while under attack by fighters, pick up SACR 3-1, Mission Employment Tactics.

Finally, you've completed your assigned task and **it's Miller Time** . . . well, not so fast. A minor detail like getting to the post strike base still remains. An article in USAF Flight Weapons, Summer 1985, Vol 33, has an article entitled "Fratricide." It states "To successfully return from your mission, you **must:**

- Follow the procedured rules of identification.
- Be prepared to identify yourself to friendly multinational fighters using your IFF capabilities.
- Properly navigate through the fire units using the VULCAN, DAVID, CHAPARRAL, and STINGER systems.

You might say to yourself, WHY? I'm going as low and fast as possible, ain't nobody going to catch me! This may be great for Red Flag, but let's face reality. You're low on fuel, been up for who knows how long, and to top it off, you're probably going into an environment that you really don't know about. The friendly fighters and air defense systems will expect you to use your egress route. If they spot somebody not following the correct procedures coming from enemy territory, you've probably just become a smoking hole in the ground. Let's not give the Eagle drivers another shot at us. Fly your planned track and adhere to the correct procedures.

You've been given a lot of food for thought. As mentioned, SACR 3-1, Mission Employment Tactics, will help give you a little more insight into the enemy threat and your aircraft's capabilities. Keep abreast of the new technologies and know your aircrew tactics so you can tactically FLY, FIGHT . . . and WIN!

About the author.

Capt Jim "Whit" Whitney is an FB-111 pilot with over 900 hours. He has been to Red Flag in both the B-52 and FB-111. Selected as the first B-52 copilot to fly the FB-111 at Pease AFB, he is currently an instructor at the 530th SBTS, Plattsburgh AFB.

SAC SAFETY SCREEN

905 AREFS, Grand Forks Crew E-113: AC Capt Billy R Miles, CP 1Lt Larmar M Lex, N 1Lt Wallace J Kost, BO SrA Daniel V Elam

46 BMS, Grand Forks Crew R-28: AC Capt Patrick L Ebner, CP 1Lt Michael F Arnold, RN Capt Michael S Meyers, N 1Lt Martin C Tann, EW Capt Mark S Nelson, G A1C Bobby L Keys

43 AREFS, Fairchild Crew R-121: MP Capt Paul L Myers, MC 1Lt Joseph P Intardonato, MN 1Lt John H Allen, IB TSgt Roy L Hewitt

43 AREFS, Fairchild Crew R-135: MP Capt Thomas K Bostwick, MC 1Lt Sheldon M Schlicht, MN 1Lt Mark L Myers, MB Sgt Dean M Pickering

1 ACCS, Offutt Crew: P Maj Gregory R Brown, P Capt Thomas L Peterson, N Capt Randall C Hulse, FE TSgt Robert J Pakney, APS MSgt James W Anderson

325 BMS, Fairchild Crew R-42: P Capt Scott Jackson, CP Capt Dave Bronson, RN Capt Mike Forbes, N 1Lt Mark Crow, EW 1Lt Dave Cothran, G SrA David Johannes

325 BMS, Fairchild Crew E-11: P Lt Col Bob Kirkwood, CP Capt Mario Pauda, RN Capt Rollan Moriak, N 1Lt Pat Pope, EW 1Lt Kent Garner, G TSgt Al Nasimok

60 BMS, Andersen Crew R-15: AC Maj Thaddeus Jones Jr, CP Capt David F Gregg, RN Capt James A Dunn, N 1Lt David L Strom, EW 1Lt Jeffery J Warnement, G TSgt Michael L Schuster

60 BMS, Andersen Crew R-32: AC Maj James W Smail, CP 1Lt Gregory J Gordon, RN Capt Timothy D Vinoski, N Capt Kevin A Heard, EW 1Lt Moses B Winston, G TSgt John W Turner

911 AREFS, Seymour Johnson Crew: P Maj Michael Laney, CP Capt Gary Byrd, FE TSgt Myron Troutman, FE TSgt Richard Busch, BO TSgt John Page, BO SSgt Larry Roberts

97 AREFS, Blytheville Crew S-102: AC Capt Scott Shaw, CP 1Lt Michael F Connolly, N Capt Ector D Shepard, BO SSgt Eddie J Cole

97 AREFS, Blytheville Crew E-121: AC Maj Jeffrey Seymour, CP Capt Timothy J Rose, N Capt Curtis E Davis, BO Sgt John R Gibbs

340 BMS, Blytheville Crew R-21: AC Capt Robert M Robertson, CP 1Lt Brian D Anderson, RN Capt Douglas S Black, NN 2Lt Charles T Frye, EW 1Lt Michael A Wilke, G A1C Michael D Crockett

340 BMS, Blytheville Crew S-30: AC Maj Thomas V Macry, CPx Capt Robert H Johnson, CPy 2Lt Randall K Nuss, RN Capt David A Romer, NN Capt Mark W Bryant, EW 1Lt Paul L Christiansen, G SSgt Samuel S Brucks

931 AREFG, Grissom Crew: IP Maj Anthony P Capoccia, IP Maj James S Lehman, N Capt John M Salmon, BO SSgt Jeffrey P Henry

668 BMS, Griffiss Crew E-11: P Maj Thomas Clark, CP 1Lt Robert A Heminger, RN Capt Louis V Baum, N Capt Paul B Fleming, EW 1Lt David A Beigel, G TSgt Jeffrey H Noecker

99 AREFS, Robins Crew R-163: IP Capt Mario Mastrandrea Jr, CP 1Lt Scott A Wollwine, NN 2Lt Herbert W Holwick, BO SSgt Billy W Shelley

912 AREFS, Robins Crew R-133: FP Capt Richard M Whitfield, CP Capt Jared A Tebben, NN 1Lt Eddy L Buffkin, BO Sgt Jesus M Lopez

42 AREFS, Loring Crew R-110: P Capt Michael F Clover, CP 1Lt Scott A Wilson, NN 1Lt Eric K Huber, IBO A1C Darin T Welsh

69 BMS, Loring Crew E-22: IP Capt Michael O'Brien, CPX 1Lt John K Keenan, CPY 1Lt Douglas Rogers, RN Capt Ernest R Liberatore Jr, NN 1Lt Richard M Stuckey, EW 1Lt Richard E Prater, IG Sgt James D Mumford

407 AREFS, Loring Crew R-181: P Capt Teresa Popp, CP 1Lt Donald Carter, NN 1Lt John Hambel, BO TSgt Richard Newman

715 BMS, Pease Crew E-22: P Capt Timothy C Jones, N Capt Robert K Umstaedter

715 BMS, Pease Crew E-16: P Capt Robert B Thompson, N Capt Stephen V Sommers

715 BMS, Pease Crew E-12: P Capt Roger P Lougee, N Capt Joseph E Hughes

393 BMS, Pease Crew: AC (Crew S-03) Maj Doug Spears, RN (Crew E-29) Capt Rick Goad

393 BMS, Pease Crew: AC (Crew E-25) Capt Tom Kana, RN (Crew S-23) Capt Dave Cohill

644 BMS, K I Sawyer Crew E-45: P Capt Robert L Heim, CP Lt Bryan K Bartels, RN Capt Michael F Hayden, N Lt Steven M Showalter, EW Lt David M McCullers, G TSgt Alan W Trickey

46 AREFS, K I Sawyer Crew R-112: P Capt Bill Nichols, CP 1Lt Marty Dravis, N 1Lt Dave Kneram, BO SSgt Chuck Obanion

46 AREFS, K I Sawyer Crew R-124: P Capt Mike Bell, CP 1Lt Chuck Myers, N 1Lt Matt Woollen, BO Sgt Rich Kempfer

307 AREFS, K I Sawyer Crew R-183: AC Capt James M McGregor, CP 1Lt Brian G Zalenas, NN 2Lt Mark C Lane, BO SSgt Terry J Klementz

909 AREFS, Kadena Crew R-110: P Maj Thomas B Pickens, CP 1Lt Andrew M Wolfe, N Capt Michael R Scott, BO Sgt James G Hebert

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